THE NETHERLANDS

THE NETHERLANDS[1]

1. ENERGY, ECONOMIC AND ELECTRICITY INFORMATION

1.1. General Overview

The Netherlands is a small, flat country in northwest Europe situated on the North Sea shore with a maritime climate. The country is densely inhabited and the population growth is nearly constant. In 2000, the Netherlands had a population of about 16 million with the population density of about 472 inhabitants per square kilometre. Its growth rate was estimated at 0.6 % (Table 1).

The Netherlands is the 'Gateway to Europe' for trade and distribution, with harbours in Rotterdam and Amsterdam.

TABLE 1. POPULATION INFORMATION

	1970	1980	1990	2000	2001	2002	Growth rate (%/yr) 1990 To 2002
Population (millions)	13.0	14.1	15.0	15.9	16.0	16.1	0.6
Population density (inhabitants/km²)	349.1	378.9	400.5	425.9	428.1	430.4	

Predicted population growth rate (%) 2002 to 2010	1.5
Area (1000 km²)	37.3
Urban population in 2002 as percent of total	89.7

Source: IAEA Energy and Economic Database.

1.1.1. Economic Indicators

In 2000, Netherlands' Total Gross Production was 1,664 billion guilders. Gross Domestic Product amounted to 883 billion guilders, while domestic consumption was 641 billion guilders and total domestic investments amounted to 200 billion guilders. Gross domestic growth rate was 4%. The historical growth rates are shown in Table 2.

TABLE 2. GROSS DOMESTIC PRODUCT (GDP)

	1980	1990	2000	2001	2002	Growth rate (%/yr) 1990 To 2002
GDP (millions of current US$)	178,963	295,379	369,531	360,215	356,500	1.6
GDP (millions of constant 1990 US$)	238,011	295,379	391,737	406,785	422,415	3
GDP per capita (current US$/capita)	12,653	19,755	23,245	22,538	22,189	1.0

Source: IAEA Energy and Economic Database.

[1] The profile has been updated by the Secretariat, mainly by replacing the statistical information in the Tables with EEDB and arranging contents according to the revised table of contents.

1.1.2. Energy Situation

After the USA, the Russian Federation, Canada, the UK, Algeria, Iran and Indonesia, the Netherlands is the world's eights biggest producer of natural gas. The importance of energy in the Netherlands emerges from the possession of an important energy resource: natural gas (Table 3). Total energy consumption in the Netherlands consists of natural gas (48.2%), oil (35.2%), coal (10.9%), and nuclear energy (1.3%) and renewable energy resources (3.4%).

TABLE 3. ESTIMATED ENERGY RESERVES

	Estimated energy reserves in (Exajoule)					
	Solid	**Liquid**	**Gas**	**Uranium (1)**	**Hydro (2)**	**Total**
Total amount in place	14.56	0.55	60.33		0.10	75.54

(1) This total represents essentially recoverable reserves.

(2) For comparison purposes a rough attempt is made to convert hydro capacity to energy by multiplying the gross theoretical annual capability (World Energy Council - 2002) by a factor of 10.

Source: IAEA Energy and Economic Database.

TABLE 4. ENERGY STATISTICS(*)

							Average annual growth rate (%)	
	1970	**1980**	**1990**	**2000**	**2001**	**2002**	**1970 To 1990**	**1990 To 2002**
Energy consumption								
- Total (1)	2.08	2.93	3.12	3.25	3.37	3.49	2.04	0.93
- Solids (2)	0.21	0.16	0.45	0.38	0.38	0.38	3.96	-1.42
- Liquids	1.16	1.12	1.12	1.02	1.04	1.05	-0.18	-0.55
- Gases	0.72	1.61	1.43	1.63	1.72	1.81	3.51	1.96
- Primary electricity (3)		0.04	0.12	0.22	0.23	0.25	35.99	6.34
Energy production								
- Total	1.33	3.51	2.74	2.58	2.42	2.29	3.67	-1.48
- Solids	0.13						-20.14	1.79
- Liquids	0.08	0.07	0.17	0.10	0.10	0.09	3.76	-5.00
- Gases	1.12	3.40	2.54	2.43	2.27	2.16	4.19	-1.36
- Primary electricity (3)		0.04	0.03	0.05	0.05	0.05	11.87	2.65
Net import (Import - Export)								
- Total	1.20	-0.09	0.79	1.31	1.59	1.87	-2.10	7.48
- Solids	0.07	0.16	0.43	0.39	0.34	0.24	9.24	-4.60
- Liquids	1.53	1.54	1.47	1.72	1.79	1.87	-0.20	2.05
- Gases	-0.40	-1.79	-1.11	-0.80	-0.55	-0.25	5.24	-11.73

(1) Energy consumption = Primary energy consumption + Net import (Import - Export) of secondary energy.

(2) Solid fuels include coal, lignite and commercial wood.

(3) Primary electricity = Hydro + Geothermal + Nuclear + Wind.

(*) Energy values are in Exajoule except where indicated.

Source: IAEA Energy and Economic Database.

1.2. Energy Policy

The Dutch energy policy is built upon three pillars: liberalisation, sustainability and security of supply.

New electricity and gas acts have been introduced. These acts provide the legal framework for the liberalisation of the gas and electricity sector. Not later than 2004, all energy users will be free to

choose their own energy supplier. The aim of the liberalisation is to break monopolies to ensure that all customers are better served and to enhance economic efficiency. The liberalisation is embedded in the policy of the European Union and will ultimately result in a single European energy market.

The second pillar is sustainability. The Netherlands have ambitious targets on energy efficiency (+ 2% per annum) and renewable energy (10% of total energy use in 2020). The sense of urgency of sustainability is determined by the climate change. The goals on energy efficiency and renewable energy are part of the policy to reach the Dutch Kyoto goal of minus 6% compared to 1990. The Dutch government has decided that 50% of these emissions should be realised in the Netherlands. The other 50% can be realised by means of the flexible instruments agreed upon in Kyoto (Joint Implementation, Clean Development Mechanism and Emission Trading). The national target will be reached, among others, by a CO_2 reducing scheme, use of cleaner fossil fuels in electricity generation, energy efficiency in private transport and energy savings in housing.

The issue of security of supply is of growing importance. The European Union expects a growing dependency on import (50% currently, 70% by 2020). Oil prices show an increasing volatility and the recent supply developments in California raise the question whether this could happen in the Netherlands as well. Both liberalisation (internal market) and sustainability (rising the share of renewable energy in the long term) can contribute to security of supply. Nevertheless, countries have to be aware of possible problems.

1.3. The Electricity System

1.3.1. Structure of the electricity sector

In the past, planning and production in the electricity sector was co-ordinated by a central body, the N.V. Samenwerkende Elektriciteits-Productiebedrijven (Sep), which drew up planning schemes. A typical scheme covered the next ten years of production, based on demand forecasts. The four electricity production companies in turn, implemented the decisions of the planning schemes. Every two years a new scheme was drawn up by Sep in co-operation with the before mentioned production companies and the distribution sector for final approval by the Ministry of Economic Affairs. Centralized electricity generation was carried out by four production companies EPON, EPZ, EZH and UNA, which co-operated in Sep until its dissolution on January 1 2001, following the transition Act “Overgangswet Elektriciteitsproductiesector”. EPZ separated recently into NV EPZ joint venture (including the Borssele site with its nuclear power plant) and EEP BV.

The legislative preparation of the Electricity Act 1998 was finalized in June 1999. Rules relating to the production, transport and supply of electricity partly entered into force on 1 August 1998. As of this date, the production of electricity is free, network-managers are appointed and the Electricity Act administration and supervision department is in function. Since then, all except one production company have been privatized and are now owned by foreign companies. Distribution companies are still publicly owned.

Parliamentary discussion on the ownership (public or private) of energy distribution companies has been under way since 1999 and is reaching its final stage during this summer. Legislation on this subject is expected in 2002 following policy rules, on which basis the Minister of Economic Affairs may approve certain privatisation requests after January 1st 2002.

1.3.2. Decision making Process

Concerning the construction of new electricity generation, there are no specific requirements to be fulfilled by applicants. The Netherlands operates a system of authorization. For all construction purposes the same authorization procedure applies. The ministry of Economic Affairs has no role to

play in this procedure. Depending on the scale of the project, the authorizations needed are being dealt with either by the Ministry of Housing and Environment or by lower authorities.

With the entry into force of the Electricity Act 1998, the production cartel of the four co-operating production companies through Sep will be dismantled, the co-operation agreement dissolved. The envisaged merger of the four production companies has sprung off in April 1998.

In December 2000, Parliament accepted the Electricity Production Sector Transition Act . This Act forms the basis for a binding regulation for the division of the obligations of the production companies as in the earlier Co-operation Agreement between the production companies and Sep. By this Act, the Co-operation Agreement has ceased to exist. The authorities propose to introduce a levy on the transmission tariff to compensate stranded costs for producers, concerning district-heating contracts and Demkolec, a demonstration coal gasification plant in Buggenum. This levy is now being investigated by the European Commission.

Opening of the market - time schedule

The Dutch market will be opened in three steps:

Step 1
As from 1 January 1999, all consumers are eligible with an available electrical capacity of more than 2 MW per connection. Customers of over 20 GW·h are eligible in any event. This represents one third of the electricity customers.

Step 2
As from 1 January 2002, all consumers are eligible who have a total maximum transmission value of more than 380 A. This, together with step 1, represents two thirds of the electricity customers.

Step 3
As from 1 January 2004 or if possible earlier in 2003, all electricity consumers in the Netherlands will be free to choose their electricity supplier.

Access to the network

The Dutch law does not make the distinction between transmission and distribution networks. The distinction is between the national and regional networks. The national high-voltage network consists of the networks which are intended for the transport of electricity at a voltage of 220 kV or above and which are operated accordingly, together with the networks which cross the national borders at a voltage level of 500 V or above. Anything below this voltage level is considered as regional network.

The rules and tariffs relating to access to the network are contained in the supplementary law, which is approved by Parliament in June 1999. The proposed rules are according to following principles:

- Access to the network on the basis of published tariffs- Regulated Third Party Access. The transmission tariff is a non-distance related 'postage stamp' tariff - a point tariff.
- The tariffs are set by the Director of the Office for Energy Regulation (“Dienst Toezicht en Uitvoering Elektriciteitswet”, DTe, the regulator). The formula used to set the tariffs is related to the consumer price index and includes an element of benchmarking, a deduction is operated to further efficient operation by network managers. This tariff setting will be effective as from 1 January 2000.
- The tariffs for 1999 are still established according to the 1989 Electricity Act, set by the electricity companies and agreed by the minister. They are maximum end-user tariffs.

- In 1999, the electricity sector will make a proposal for the manner in which the new tariffs will be set. The new tariffs consist of components for network services and of a supply component.

Unbundling

Management Unbundling

The unbundling as laid down in the Dutch Electricity Act takes the form of complete legal separation of the activities of the managers of the network and of producers/suppliers. The operation of the national network used to be run by SEP, which co-ordinated activities of the four production companies under the pre-liberalization system.

In October 1998, a separate legal entity has been created which operates the transmission system. The Transmission System Operator responsible for the national high-voltage network (above 220 kV) is TenneT, which will be fully owned by the state following the Electricity Production Sector Transition Act.

The Electricity Act states that separate legal entities (companies limited by shares, private limited company - NV or BV) have to be appointed as network manager. No producer or supplier shall be appointed as network manager. The members of the management board and the majority of the members of the supervisory board shall have no direct or indirect affiliation to any producer, supplier or shareholder of the manager of the relevant network. Producers and suppliers shall refrain from any interference with the performance of the duties of the network manager.

Unbundling of accounts

The accounting unbundling of the activities of the network managers from production and distribution/supply is guaranteed by the fact that the network managers are separate legal entities with an obligation to publish their accounts. Supply to captive customers must be separated in the accounts of electricity companies.

-Regulatory authorities

Regulation

The Office for Energy Regulation (Dienst Uitvoering en Toezicht Energie, – DTe) - is the Dutch regulator. DTe operates as a chamber of the Dutch Competition Authority (NMa), under the authority however, of the minister of Economic Affairs.
Its tasks are essentially the following:

- Taking regulatory decisions on electricity and gas;
- Setting of rate structures for connection to the network, transport of electricity and for the provision of directly related services;
- As a mandatory, setting of rate structures for connection to the network, transport of gas and for the provision of directly related services;
- Issuing supply licences for supply of electricity and gas to captive customers;
- Issuing binding instructions and recognisances;
- Upon request advising the Minister of Economic Affairs;
- Participation in international forums of European Energy Regulators.

-Public service obligations

The concept of 'public service obligations' as such does not exist in the Electricity Act. However, there are duties and obligations contained in this Act, which would fall within the scope of this notion. In particular:

Managing of the network
The network managers are obliged to guarantee safety and reliability of the networks and of the transport in the most effective manner.

Supply to captive customers
For supply to captive customers a licence is required. The licence is subject to the meeting of certain obligations among which:

- Maximum rates for supply of electricity;
- Obligation to supply any captive consumers who so requests, unless the licence holder cannot reasonably be required to supply the consumer.

Environment

- Producers and suppliers have the task of promoting the efficient and environmentally responsible production or use of electricity by themselves and by customers;.
- Licence holders have a purchase obligation of green electricity produced by captive customers and by small wind/solar producers;
- The market of green electricity will be opened from July 1st. This means that all consumers of green electricity can choose between suppliers of green electricity;
- To support the market of green electricity, the Dutch authorities have implemented a green certificate scheme;
- Consumers of electricity do not have a purchase obligation for e amount of green electricity. The expectation is that the demand of green electricity will grow by opening the market.

-Other issues

Reciprocity
From January 1, 2000 all customers with a yearly consumption larger than 100 GW·h are eligible for imports from all EU Member States and third countries. Customers with a yearly consumption below 100 GW·h in some cases will not be given capacity on the network to import electricity and thus prevented to import. When they import from countries where the electricity market is fully opened, they are allowed to import. Customers with a yearly consumption below 1 GW·h are prevented to import from countries, which have opened their market for customers with a yearly consumption above 1 GW·h. Customers with a yearly consumption below 20 GW·h are prevented to import from countries, which have opened their market for customers with a yearly consumption above 20 GW·h. Imports from countries, which have not implemented the directive properly and from Switzerland, are prevented to import in all cases. These rules also apply to suppliers.

Developments
The Electricity Pool, Amsterdam Power Exchange (APX) is operational as of May 1999. Trade will be in kW·h. The Electricity Act provides for the possibility for the TSO to own a daily spot market where electricity will be traded a day ahead with hourly pricing and a minimum volume of 100 kW·h. Foreign producers, consumers, traders and suppliers are allowed to buy and sell, but the reciprocity clause is applied to consumers under 20 GW·h. It is foreseen that the daily spot market will be transferred from APX to TenneT in 2001.

1.3.3. Main Indicators

In the Netherlands, the share of electricity in total energy consumption is 12.3%. In 1998, installed electricity generation capacity in the Netherlands amounted to 20 211 MW(e). Electricity production by fossil fuel was 78 TW·h, and by nuclear means 3.4 TW·h. Presently, electricity imports are about 15.7% (13.1 TW·h) of the total electricity production, while nuclear electricity is about 4%. Table 5 shows the historical electricity production and the installed capacity and Table 6 the energy related ratios.

The installed generating capacity, through Sep, was around 14 000 MW. The generating capacity installed at auto-producers was 6 200. The majority of this capacity is installed at industrial companies or electricity distribution companies, often as joint ventures with the industrial sector.

In 1998, 61% of electricity supply was generated through Sep, 6% was generated by energy distribution companies, 20% by other decentralized producers. Decentralized generation is mainly carried out by Combined heat and power plants. 13% of electricity was imported. Sep enjoyed a statutory monopoly over imports, meaning that is controlled 74% of power supplied to the Dutch market in 1998. Of the decentralized production, around fifty percent is supplied to the grid.

The majority of generation plants in the Netherlands are suitable for burning two or more types of fuel. In 1998, the generating capacity through Sep by fuel was 44.1% by coal, 0.1% by oil, 48.1% by gas and 7.7% by nuclear. The fuel mix for the total domestic electricity generation (including CHP/autoproducers) shows a significant dependence on natural gas. Gas is used to generate around 60% of Dutch electricity. There are no specific provisions in the Dutch legislation concerning generation. It is considered as a free economic activity, not subject to specific regulation.

Netherlands only operation nuclear power plant at Borssele, starting operation in 1973 and having a net capacity of 449 MWe, had an excellent year in 1999. One of the main reasons was the successful completion of the backfitting in 1997. During the backfitting period a large refurbishment of the power plant was undertaken. Its safety level nearly increased by a factor of 10 as the core melt frequency decreased from $5.6\ 10^{-5}$ to $4.5\ 10^{-6}$. The power plants availability was 96 % while its load factor was 93 % over the year 2000. It turned out that there was a substantial international interest for Borssele's refurbishment.

TABLE 5. ELECTRICITY PRODUCTION AND INSTALLED CAPACITY

							Average annual growth rate (%)	
	1970	1980	1990	2000	2001	2002	1970 To 1990	1990 To 2002
Electricity production (TW.h)								
- Total (1)	40.86	64.81	71.87	91.88	93.22	94.93	2.86	2.35
- Thermal	40.49	60.61	68.40	87.21	88.45	90.18	2.66	2.33
- Hydro			0.12	0.14	0.15	0.15		1.87
- Nuclear	0.37	4.20	3.30	3.70	3.75	3.69	11.59	0.93
- Geothermal								
Capacity of electrical plants (GWe)								
- Total	10.16	17.29	17.44	21.00	21.56	22.27	2.74	2.06
- Thermal	10.11	16.80	16.85	20.07	20.57	21.17	2.59	1.92
- Hydro			0.04	0.04	0.04	0.04		0.23
- Nuclear	0.05	0.50	0.50	0.45	0.45	0.45	12.36	-0.94
- Geothermal								
- Wind			0.05	0.44	0.51	0.61		23.54

(1) Electricity losses are not deducted.

(*) Energy values are in Exajoule except where indicated.

Source: IAEA Energy and Economic Database.

TABLE 6. ENERGY RELATED RATIOS

	1970	1980	1990	2000	2001	2002
Energy consumption per capita (GJ/capita)	160	207	209	204	211	217
Electricity per capita (kW.h/capita)	2,978	4,360	5,217	6,739	6,905	7,145
Electricity production/Energy production (%)	30	18	25	34	37	40
Nuclear/Total electricity (%)	1	6	5	4	4	4
Ratio of external dependency (%) (1)	58	-3	25	40	47	53
Load factor of electricity plants						
- Total (%)	46	43	47	50	49	49
- Thermal	46	41	46	50	49	49
- Hydro			38	44	46	46
- Nuclear	86	96	75	94	95	94

(1) Net import / Total energy consumption.

Source: IAEA Energy and Economic Database.

A couple of years ago the Government took the decision that the plant has to shut down at the end of the year 2003 and consequently a validity date until then was written into the license. The legal grounds of this action turned out to be insufficient and the Dutch State Council judged that the Government took a wrong way to put its decision into effect. However, the Government decided recently to maintain its decision to shut down at the end of 2003. Consequently, a lawsuit has been filed to force the operator EPZ to accomplish.

Nuclear percentage from total electricity production (centr. and decentr.): 4 %
Nuclear percentage from central electricity production: 6 %.

2. NUCLEAR POWER SITUATION

2.1. Historical Development and current nuclear power organizational structure

In 1968, the first nuclear power plant, at Dodewaard, was connected to the grid. The original goal of the Dodewaard facility was to gain practical knowledge and experience with nuclear power in order to determine whether commercial application of nuclear power would be feasible. Later in 1971, the Borssele nuclear power plant began operation. Decisions taken by the Dutch Government and Parliament in 1974 and 1975, to expand the number of nuclear power plants were subsequently deferred pending resolution of debates on the issue. Similar decisions taken in 1985 and 1986 were also suspended, following the Chernobyl accident. Since that time, the Netherlands Government has initiated various studies and research programmes, especially in the field of nuclear safety and on radioactive waste. In the mean time, nuclear energy is held as viable option for the future, especially in view of increased environmental concerns. No new construction of nuclear plants is foreseen in the near future.

2.2. Nuclear Power Plants: Status and Operations

TABLE 7. STATUS OF NUCLEAR POWER PLANTS

Station	Type	Capacity	Operator	Status	Reactor Supplier
BORSSELE	PWR	449	EPZ	Operational	KWU/STORK
DODEWAARD	BWR	55	GKN(NL)	Shut Down	GE/STORK

Station	Construction Date	Criticality Date	Grid Date	Commercial Date	Shutdown Date
BORSSELE	01-Jul-69	20-Jun-73	04-Jul-73	26-Oct-73	End 2003
DODEWAARD	01-May-65	24-Jun-68	18-Oct-68	15-Jan-69	26-Mar-1997

Source: IAEA Power Reactor Information System as of 31 December 2002.

The main purpose of the Dodewaard nuclear power plant was to conduct nuclear experiments for commercial applications. The Dodewaard plant was the only reactor in the world which was cooled by natural circulation. It made the plant most suitable for verification experiments on a commercial scale.

In the Netherlands, nuclear energy is used exclusively for producing electricity. Compared with countries such as Belgium and France, nuclear energy plays a modest role in the Netherlands. In evaluating the desirability of nuclear energy, the Netherlands considers the environmental effects as well as aspects of risk, safety and the problem of radioactive waste. This means studying the effects of the entire fuel cycle. Such a study has shown that there are no factors present which might prohibit the use of nuclear energy in the Netherlands.

Even though Dutch public attitudes toward nuclear energy indicate opposition to construction of new nuclear power plants, there are differing views on nuclear energy as an option in itself. Demand for new centralised power plants in the next ten years is not foreseen. However, each electricity generating option poses its own problems. The availability of information on these problems tends to influence public opinion.

The intervening ten-year period could be used for development of more advanced and innovative nuclear power reactors. Such development could win sufficient public support, since the enhanced safety features of new reactor designs can be communicated to the general public in a more objective manner. Until then, use of the existing nuclear power plants will be maintained until the end of 2003.

As regards nuclear energy policy, no increase of nuclear capacity is expected for the foreseeable future. The governmental policy is that the nuclear option will be kept open in order "to board the train" if that would be desirable. Within this context the Netherlands participates in international nuclear research projects in the field of nuclear safety, decommissioning and nuclear waste (see Section 4.5).

2.3. Supply of Nuclear Power Plants

The entire Dodewaard plant and 70% of the Borssele plant were manufactured in the Netherlands.

Supplier of Dodewaard: General Electric (GE)
Supplier of Borssele: Kraftwerk Union (KWU)/Siemens.

2.4. Operation of Nuclear Power Plants

Operator of the Dodewaard plant is NV GKN: Joint Nuclear Power Plant the Netherlands Ltd. Operator of the Borssele plant is NV EPZ: The Electricity Generating Company for the southern Netherlands.

NRG (Nuclear Research and Consulting Group, which was established in 1998 through the merger of ECN/s and KEMA's business activities in the nuclear fields) operates the HFR (High Flux Reactor) in Petten. This nuclear research reactor is owned by the European Commission, but operated by NRG.

2.5. Fuel Cycle and Waste Management

Uranium enrichment in the Netherlands is carried out by Urenco Nederland B.V. Urenco Nederland B.V. belongs to a multinational company, Urenco Ltd, located at Marlow, which has three shareholders: UCN NV (Ultra Centrifuge Netherlands) in the Netherlands, Uranit in Germany and INFL in the UK. The Netherlands government owns the majority of the shares (99%) in UCN.

Uranium enrichment is the most important part of the fuel cycle for the Netherlands and it is very successful. Urenco Nederland BV has a licence for a capacity of 2 500 t SW/a. The total uranium enrichment market share of Urenco in the western world is about 12 % and is still growing. Urenco has concluded contracts in 15 countries, including many EU countries, Switzerland, Brazil, South Africa, the United States as well as in the Far East (Korea and Japan). Urenco's success is based on its advanced gas ultra centrifuge technology. Improvements are still made in this technology as a result of an extensive R&D programme. Ultra-Centrifuge's availability was better than 99.9% in 2000. A licence for further growth was granted and SP5 (the fifth plant) started up in 1999 and ran smoothly in 2000. The decommissioning of the first UC plant (SP1) was completed successfully which resulted in another green meadow. In addition, Urenco Nederland uses this technology in spin-off activities in the aerospace markets as well as in the enrichment of stable isotopes inter alia for the nuclear sector and for medical purposes. A special plant for stable isotope production was completed, started up in 1999 and ran smoothly in 2000.

In November 1999, the Dutch Cabinet agreed to study the possibility of selling the shares of the Dutch Government in Ultra Centrifuge Nederland (UCN). Also, the Committee for Economic Affairs of the Parliament agreed to proceed with a study, provided that no irrevocable steps would be taken. Therefore, if the study favours a disposal, the decision whether or not to privatise will have to be discussed with the Parliament.

On 4 March 2000, the Treaty of Almelo, which covers collaboration in the development and exploitation of the gas centrifuge process for producing enriched uranium, completed 30 years of existence. To mark this anniversary, on 9 March 2000, the Minister of Economic Affairs of the Netherlands, Mrs. A. Jorritsma, officially inaugurated the fifth enrichment facility of Urenco Nederland. It will have a capacity of 1 000 t SWU/a and will bring the total capacity of the Dutch site in Almelo to 2 500 t SWU/a.

On 5 December 2000, Urenco's three uranium enrichment plants - Almelo in the Netherlands, Capenhurst in the United Kingdom and Gronau in Germany - achieved the landmark delivery of 50 million SWU. At the end of 2000, Urenco's total installed capacity approached 4.8 million SWU per annum. It is supplying around 12% of the total world demand for enrichment.

On 7 December 2000, USEC Inc. filed a petition with the United States Department of Commerce (DOC) and the International Trade Commission (ITC), alleging that Urenco has shipped enriched uranium to the US in violation of anti-dumping and countervailing duty laws. A similar petition has been filed against Eurodif (Cogéma: France). The petition was filed by USEC on behalf of the US domestic industry producing LEU and sought the imposition of anti-dumping and

countervailing duties. On 27 December 2000, the DOC decided to open up an investigation. On 7 May 2001, the US Department of Commerce made a preliminary determination that imports of LEU from Germany, the Netherlands and the United Kingdom would be subject to a countervailing duty rate of 3.7 and of 13.94% in the case of France. A preliminary anti-dumping determination by DOC is expected in July 2001. A final countervailing and anti-dumping determination is anticipated for September/November 2001. The European Commission in Brussels follows closely the procedure and is considering appropriate counter-action, i.e. in the framework of the WTO.

The Central Organization for Radioactive Waste (COVRA) is entrusted with the treatment and storage of all categories of radioactive waste produced in the Netherlands. According to the adopted waste management strategy, the conditioned waste is kept in an engineered intermediate storage facility for an extended period of time. Storage is conceived to take place for a period of at least 100 years. Currently, only the facility for the storage of low and intermediate level waste is in operation. The storage facility for high-level waste is under construction and is due to be commissioned in 2003. The latter storage facility is designed to accommodate reprocessed and vitrified spent fuel from the nuclear power stations, conditioned spent fuel from the research reactors as well as other types of high level waste.

Shareholders in COVRA are the main waste producers, which are the nuclear facilities at Dodewaard (30 per cent), and Borssele (30 per cent), as well as the Energy Research Foundation (30 per cent) at Petten. The remaining 10 per cent are held by the State. However, both the intention of the government to phase out the use of nuclear energy for electricity production by 2004 and the liberalisation of the electricity market as of 2001 constituted reasons for a reconsideration of the ownership of COVRA. As a consequence, plans to change the ownership of COVRA into a State-owned company are in an advanced stage: the shareholders have recently signed a letter of intent to transfer the shares in COVRA to the State before 1 July 2001. As it stands now, it will be implemented by the end of 2001.

The government has formulated a policy on radioactive waste governing long-term (about 100 years) interim surface storage and the conditions for permanent disposal. The government has decided that the disposal of radioactive material in an underground repository should be reversible. In addition, both salt formations and clay layers as well should be studied as a possible geological matrix.

Although the current radioactive waste management policy envisages no disposal in the near future, research on the suitability of deep underground rock formations in the Netherlands has been continued during the last years. The Commission CORA (Commission on radioactive waste) has been established to co-ordinate this research programme. The main characteristics of this national research programme, which started in 1996 and focused on retrievable disposal options, are outlined below:

- The scope of the research was broadened to enable comparison of the properties of different host rock materials including not only salt but sedimentary clay formations as well; it also considered extended storage at the present location, with a view to cover a period of 300 years (instead of 100 years);
- The feasibility of construction of a retrievable repository in these materials and the time-dependent performance of the additional structural requirements was analysed, the retrievability aspect being a boundary condition required by government;
- The impact of the retrievability requirement on repository design was investigated, with the understanding that the safety level should not be less than in a non-retrievable repository;
- Additional investment cost and maintenance costs of retrievable repositories in different host rocks were considered;
- The consequences of direct disposal of spent fuel originating from scientific test reactors in a geological repository was included in the programme;

- The social and ethical aspects of a retrievable disposal facility were taken into account;
- Studies to the effect of reduction of the radiotoxicity of the radioactive waste by partitioning and transmutation of the actinides and long-lived fission products were undertaken.

The final report of the CORA research programme was sent to Parliament by the minister of Economic Affairs on 21 February 2001. The main conclusions are:

- All retrievable repository options studied are technically feasible;
- The radiological consequences after failure of the containment, in the period in which access to the emplaced radioactive waste is maintained for purposes of retrieval, are three orders of magnitude higher for clay as compared with salt.
- In a situation of neglect due to loss of human control, the safety performance of both underground repositories is higher than that for extended long-term storage.

On the basis of the results and recommendations of the CORA report and the advice to be given by ILONA (an advisory body with representatives from EZ, VROM, NRG and GKN) the government will determine its position.

A discussion was initiated in Dutch Parliament about possibly terminating the reprocessing of spent fuel from Dodewaard and Borssele nuclear power stations in Sellafield and La Hague, respectively. At the request of the Ministry of Economic Affairs ECN carried out a study mainly with respect to environmental, proliferation and financial aspects of reprocessing as compared with its alternative, direct storage. In conclusion, there is only a single substantially discriminating factor: financial aspects. In the present circumstances, continuation of the reprocessing strategy is by far much cheaper than any of its alternatives studied.

The ECN study, together with a governmental paper focusing among others on historical, legislative, contractual and proliferation aspects was sent to Parliament in June, 1997. As a political standpoint Government concluded there are no urgent reasons to change the actual strategy based on reprocessing of spent fuel.

A discussion in Parliament with the Minister of Economic Affairs was scheduled in September, 1997. However, Parliament decided to postpone such a discussion and first of all have a hearing involving relevant parties. This hearing took place on 24 October 1997. Quite a few parties were invited, among which were representatives of GKN (Dodewaard), EPZ (Borssele), ECN, Greenpeace, IAEA, NCI, Cogéma and BNFL.

On 22 January 1998, there was a discussion between the Minister and a Permanent Commission of Parliament on this issue. The Government took the position that there are no weighty and urgent reasons to change present-day policy based on reprocessing of spent fuel. One of the opposition parties agreed with this position. However two of the governmental parties expressed their doubts on this issue.

On 11 March 1998, there was a plenary discussion on this subject in Parliament. The coalition introduced a motion asking for more investigations with respect to possibilities and consequences of changing the reprocessing strategy including financial aspects. This motion was acceptable to the Government and Parliament took a confirming vote on this motion.

Therefore, another study was carried out on this subject by the the Nuclear Research and consultancy Group NRG (which was established in 1998 trough the merger of ECN's and KEMA's business activities in the nuclear field). On 12 May 1999, the results of this in-depth study were sent to Parliament by the Minister of Economic Affairs. On 23 June 1999, there was a discussion between

the Minister and the Permanent Commission of Parliament on this issue. The Minister took the standpoint that the NRG study gave a more clear picture of the whole situation with respect to reprocessing as compared with the ECN study of 1997, however, it was the same picture. Therefore, the Minister took the position that there was no reason whatsoever to change the government policy with respect to reprocessing, i.e. there were no urgent reasons to change the actual strategy based on reprocessing of spent fuel. There were hardly any objections against this standpoint issued by members of the Permanent Commission. On 19 January 2000, there was yet another discussion on this issue between the Minister of Economic affairs and the Permanent Commission of Parliament. All political view points remained as they were in the past. Therefore, as it stands now, all existing reprocessing contracts will be honoured.

2.6. Research and Development Activities

The merge of the nuclear departments of ECN (Energy Research Foundation) and KEMA (Dutch electric power research institute) into the new entity NRG (Nuclear Research and consultancy Group) turned out to be successful. This new organization employs about 300 researchers and scientists. NRG is performing most nuclear R&D in the Netherlands, is committed to international projects in and outside the European Union and performs a number of commercial activities. Its commercial services have been divided into six product groups, viz. Materials, Monitoring and Inspection; Fuels, Actinides and Isotopes; Risk Management and Decision Analysis; Radiation and Environment; Irradiation Services; Plant Performance and Technology. NRG is co-operating internationally in areas like:

- High Temperature Reactor development with Japan, Germany and South Africa;
- Actinide transmutation with European laboratories;
- Mixed Oxide fuel development with Japan.

Most important is that new R&D-goals have been set and that NRG developed and improved its R&D-tools and computer codes for the design and verification of innovative as well as inherently safe nuclear reactor concepts (both LWR type and others, e.g. HTR type).

The computer codes involve the fields of nuclear reactor physics, thermal hydraulics, accidents and failures as well as structural mechanics. This means that NRG is prepared to play a role in an international co-operation leading to the design, approval and licensing of new innovative nuclear reactor concepts. However, the public opinion is not yet supporting the idea of the construction of a first of a kind on the territory of the Netherlands.

A new organisation was set up for the HFR (High Flux Reactor, 45 MW thermal). In the old situation, the HFR was owned by JRC (Joint Research Centre of the European Union) and operated under contract by NRG. In the new situation, there will be only one organisation for the HFR, which is supervised by JRC. NRG will be responsible for the operation and the commercial exploitation of the HFR. The HFR's operation was again very successful in 2000. Its load factor was nearly 80%, which was about the same as the average over the last eight years.

The HFR was especially successful in the irradiation for radioisotope production. The HFR has a share of about 70% of the European market for medical applications. Nearly 7 million people in and outside Europe were treated with its radio-isotopes.

Another issue forms the conversion of HFR's fuel from HEU to LEU. After a thorough study, the decision was taken to convert the fuel. Because of this decision, the return of spent fuel to the United States has recently been resumed.

A co-operation between the University of Delft and NRG started in the area of neutron diffraction last year. The possibilities for this technology turn out to be very interesting e.g. in the areas of material stresses and of soft condensed matter. The first scientific results were published.

Institutes, which contribute to nuclear research funded by the Netherlands government, are:

- IRI is an Inter-University Reactor Institute at Delft. IRI has a 2 MW research reactor (HOR) for educational purposes and does research on reactor physics, neutron beam physics and radiochemistry;
- GKN - a Joint Nuclear Power Plant the Netherlands Ltd.;
- FOM is a foundation for fundamental research on matter at Nieuwegein. The main physics research aimed at thermonuclear fusion is done here.

2.7. International Co-operation and Initiatives

Since the early days of the Netherlands nuclear programme, international co-operation has been considered a necessity by all those involved. Since the joint exploitation of the Halden research reactor (together with Norway) in the 1950's and 1960's until the Urenco co-operation in uranium enrichment of the present day, the Netherlands' nuclear activities have been undertaken in close co-operation with other countries. A strong interest in multilateral co-operation on nuclear energy matters within intergovernmental organizations complements the orientation toward practical co-operation with others.

Within the context of the "Open nuclear energy option" the Netherlands is interested in and remains dedicated to the development of new reactor concepts such as the advanced light water reactors and the high temperature gas-cooled reactors in order to contribute to a sustainable energy supply in the long term. As far as the development of the HTR is concerned, NRG is co-operating with ESKOM in South Africa and JAERI in Japan.

The Netherlands and Germany also co-operate in the area of subsurface radioactive waste disposal. Research in this area has been performed in Germany's Asse salt mine. In the future, transmutation of actinides (including plutonium) and other long-lived fission products may replace geological disposal. In this innovative area, Dutch institutes (as well as HFR) are involved in co-operation with JRC, French and Belgian institutes. Finally, interest has been expressed in a technology assessment of inherently safe nuclear reactors (e.g., HTGR).

3. NATIONAL LAWS AND REGULATIONS

3.1. Safety Authority and the Licensing Process

Until mid 1999, licensing and regulatory activities were the common responsibility of the Minister of Economic Affairs, the Minister for Public Housing, Planning and the Environment and the Minister of Social Affairs and Employment. The role played by the Minister of Economic Affairs in issuing licences under the Nuclear Energy Law has been the subject of some debate in the Netherlands during 1998 and the first months of 1999. The debate has centred on whether or not this role is compatible with his responsibility for the national energy supply. Talks have been taking place between the various ministries involved that have revolved around the possibility of redistributing ministerial responsibility for the implementation of the Nuclear Energy Law, insofar as nuclear installations are concerned. The Ministry of Economic Affairs currently plays a co-ordinating role in, and also carries the main responsibility for, the implementation of the Nuclear Energy Law, alongside the Ministry of Social Affairs and Employment and the Ministry of Housing, Spatial Planning and the

Environment. As most of the expertise on environmental and safety aspects is concentrated in the latter two ministries, the government investigated whether it would be worth making the Ministry of Housing, Spatial Planning and the Environment responsible for co-ordinating licensing procedures instead of the Ministry of Economic Affairs. As of 1 July 1999, agreement has been reached between the Minister of Economic Affairs and the Minister of Housing, Spatial Planning and Environment on the transfer of the co-ordinating role of the Minister of Economic Affairs. The latter will not have any longer the prime responsibility for the implementation and execution of the Nuclear Energy Act insofar as nuclear installations are concerned. The Minister of Economic Affairs, however, retains a shared responsibility for these matters. It should be mentioned that the main responsibility for energy supply policy remains with the Minister of Economic Affairs. In the Netherlands, basic legislation governing nuclear activities is contained in the Nuclear Energy Act of 1963, which has been amended on several occasions [1]. Detailed information concerning the legislative and regulatory framework can be found in [2]. This report is available within the IAEA secretariat.

3.2. Main National Laws and Regulations in Nuclear Power

By Royal Decree of 21 June 1999, maintenance of the Nuclear Energy Act and all regulations based on it - with a few exceptions - have been transferred from the Ministry of Economic Affairs (EZ) to the Ministry of Housing, Spatial Planning and the Environment (VROM). One of the reasons to perform this transfer is the wish to comply with Article 8.2 of the Nuclear Safety Convention. This article demands that appropriate steps are being undertaken to ensure that an effective separation between regulatory functions (allocated to VROM) and other functions such as promotion and utilisation of nuclear energy (EZ) be maintained.

By Royal Decree of 24 May 2000, the government decided to transfer the Nuclear Safety Department of the Ministry of Social Affairs en Employment to VROM as well. This transfer has become effective as per 1 June 2000 and reflects the decrease in the share of nuclear energy for electricity generation leading to the envisaged phase out in 2003 when the Borssele NPP is scheduled to be shut down. The transfer of the Nuclear Safety Department to VROM aims to utilise the limited human and financial resources available in the most efficient way.

Legislation

All activities relative to the import, transport, use, storage, disposal and export of radioactive material are subject to the provisions of the Nuclear Energy Act (1963, last revised 1994) [1]. This includes the construction and operation of nuclear power stations, but also of other nuclear facilities such as radioactive waste disposal facilities.

The Nuclear Energy Act is a framework act, which is enacted by separate decrees and ordinances, which aim to implement specific parts of the act. In the legislation a fundamental distinction has been made between activities related to the nuclear fuel cycle, which follow the most stringent regime, and activities related to the application of radioactive sources and electrical appliances emitting X-rays. The decrees with the most direct bearing on radioactive waste management are the Nuclear Installations, Fissionable Material and Ores Decree (1969 last revised 1994), the Radiation Protection Decree (1986 last revised 1994) and the Decree on the appointment of the Central Organisation of Radioactive Waste (COVRA) as recognised waste management organisation (1987).

Both promotion and protection aspects of nuclear energy are combined under the same act. The Nuclear Energy Act also designates the various competent authorities and outlines their responsibilities.

The Regulatory Body

The Regulatory Body for radioactive waste management coincides with other regulatory functions regarding implementation and enforcement of the Nuclear Energy Act. Several Ministries are involved, each for its specific area of responsibility. That means that regulatory responsibility is divided between different organisations. The most involved ministries are the following:

- Ministry of Housing, Spatial Planning and the Environment, for protection of the general public and the environment;
- Ministry of Economic Affairs, with the responsibility to ensure the undisturbed supply of electricity to the public and for physical protection and safeguards;
- Ministry of Labour and Employment, for protection of the workers exposed to radiation from practices involving radioactive material;
- Ministry of Health, Welfare and Sport for protection of the patient undergoing medical examination and treatment;
- Ministry of the Interior, for emergency response to large-scale accidents involving radioactive material.

As regards radioactive waste management, much emphasis is placed on aspects associated with protection of the population at large and the environment and consequently, the Ministry of Housing, Spatial Planning and the Environment has a leading position in this area.

Licensing

The Nuclear Energy Act requires a license issued by the Regulatory Body for all activities involving radioactive materials, fissionable materials and ores when they exceed certain pre-set exemption levels. These activities include import, export, transport, preparation, use, storage, release and disposal of materials and construction and operation of facilities. With the objective to achieve a complete separation between promotion and protection aspects of nuclear energy applications, the prime responsibility with respect to licensing has recently been assigned to the Ministry of Housing, Spatial Planning and the Environment for all licenses. In a revision of the Nuclear Energy Act, which is yet to be implemented, also decommissioning of nuclear installations will become an activity for which a license is required.

In parallel to the Nuclear Energy Act, there are two other acts which have a bearing on the possibility of acquiring or modifying a license:

- The Environmental Protection Act, which stipulates that an Environmental Impact Assessment be presented if an application for a license or, in certain cases, a modification of a license is made;
- The General Administrative Law Act, which sets out the procedures for obtaining a license including the specification of maximum terms for each decision step in the process and lays down the rights of the public to raise objections and appeals to a license.

Regulatory inspections and enforcement

Article 58 of the Nuclear Energy Act states that the ministers who are responsible for licensing should entrust designated officials with the task of supervising inspection and enforcement. The main bodies for inspection and enforcement are the Nuclear Safety Division, - as of 1 July 2000 transferred from the Ministry of Social Affairs and Employment to the Ministry of Housing, Spatial Planning and the Environment as result of a Government decision to concentrate regulatory functions on radiation protection and nuclear safety in a single organisation -, and the Environment Inspectorate of the same ministry. The Nuclear Security and Safeguards Section of the Ministry of Economic Affairs remains responsible for physical protection of nuclear installations and for safeguards of nuclear material.

Decommissioning and waste disposal strategies including their associated costs have been determined. Funds are being raised from the proceeds from the electricity tariffs.

4. CURRENT ISSUES AND DEVELOPMENTS ON NUCLEAR POWER

4.1. Energy Policy

During the autumn of 1994, when the new cabinet took over, discussions took place in Parliament whether the lifetime of the Borssele nuclear power plant should be extended by three years from 2004 till 2007. Year 2004 was the original date for the reactor's decommissioning before Borssele's shareholders applied for a three-year life extension in order to justify a 450 million-guilder safety related backfitting programme. The previous government had issued licenses for the backfitting, which had already begun. This made it difficult for the present government to withdraw the permission. But, on 23 November 1994, Dutch Parliament passed a resolution calling on the government to "waive plans to permit lifetime extension" for Borssele. Meanwhile, the Minister of Economic Affairs had been negotiating with the electricity producers (SEP) for a politically and economically acceptable compromise. Finally, the Dutch government and the electricity producers agreed, in December 1994, that the Borssele nuclear plant is to be shut down at the end of 2003. In exchange, SEP will be compensated 70 million guilders allowing it to complete the safety-related backfitting programme. The updating and modification programme was completed by mid 1997 and consisted of the following features:

- a comparison with modern safety regulations and practices, and the initiation of plant modifications where these were deemed useful or necessary, to enable the plant to comply with these regulations and practices insofar as was practical; this work covered design, operation and quality assurance;
- the installation of hardware to help control or mitigate the effects of major accidents; such hardware included a filtered containment vent and catalytic hydrogen recombiners;
- a full-scope PSA, comprising levels 1,2, and 3, to identify plant vulnerabilities and to compare the plant risk with predefined quantitative risk objectives;
- a full-scope replica simulator for the training of plant staff.

However, in February 2000, the State Council cancelled the time limit of 31 December 2003, which was introduced by the Regulatory Body in the nuclear license for the Borssele plant. As a result of that decision, there was not anymore a time limit specified in the license. Furthermore, EPZ, the owner of NPP Borssele, denied that there was any arrangement with the Government to close the plant by the end of 2003. Therefore, the Government decided to have a civil procedure aiming at closing the NPP by the end of 2003. A verdict by the court is expected on 21 September 2001.

A similar backfitting programme was performed at Dodewaard but was interrupted by the decision to halt plant operation. On 3 October 1996, the Board of Directors of the Dutch utility SEP (N.V. Samenwerkende elektricititeitsproduktiebedrijven) decided to permanently shut down the Dodewaard reactor in the near future. The shut-down became effective as of 26 March 1997. This decision was taken for two main reasons: firstly, the SEP felt that there was no longer any prospect of the Dutch government giving the go-ahead to the further development of nuclear energy in the Netherlands in the foreseeable future. Secondly, the Dodewaard NPP had been built primarily as a means of gaining experience with nuclear energy. It was never "economic" in the sense that revenues were higher than costs and this situation was likely to be exacerbated by the impending deregulation of the European electricity market.

Dodewaard became operational in 1968. It was designed to operate with natural circulation, and was fitted with an isolation condenser to remove excess heat, properties that later became standard

features of the new BWR design with passive safety characteristics. Originally planned to operate until 1 January 1995, its economic life was first extended to 1 January 1997, and later to 2004. The plant is now in the decommissioning phase. It has been decided to have a protective storage period of 40 years, after conservation measures have been put in place, before its final decommissioning.

4.2. Privatisation and deregulation

For the impact of open electricity market on the nuclear sector distinction has to be made between existing generating capacity and new to be ordered nuclear capacity.

As fuel as well as operating costs for existing nuclear power plants are low compared to fossil plants it is attractive from an economical point of view to extend plant life as long as possible. As a consequence many operators of nuclear power plants are considering investments in plant life extension. In the Borssele nuclear power plant, such a refurbishment programme was successfully executed in '96/97. However because of a governmental decision Borssele will be shut down at the end of 2003.

New to be constructed nuclear power plants are not planned, neither in the US nor in Western Europe. The opening of the electricity markets might be not favourable for new nuclear capacity as nuclear possesses high investment costs, long construction periods (at least 5 years) and an uncertain public acceptance. Consequently, the financial risks going with nuclear are much higher than the ones of gas-fired capacity e.g. CCGT.

REFERENCES

[1] Nuclear Energy Act, Bulletin of Acts Orders and Decrees, 82, 1963 as revised 1994.

[2] National Report of the Netherlands under the Convention on Nuclear Safety, The Hague, 28 September 1998 15-27.

[3] Dossier on Nuclear Energy of 15 November 1993 (TK '93-'94, 21.666 nr. 8).

[4] IAEA, Energy an d Economic Data Base (EEDB).

[5] Data & Statistics, The World Bank , www.worldbank.org/data.

[6] IAEA Power Reactor Information System (PRIS).

Appendix 1

INTERNATIONAL, MULTILATERAL AND BILATERAL AGREEMENTS

The following is a list of International Conventions and Bilateral Agreements signed/ratified by the Kingdom of the Netherlands in the field of Nuclear Co-operation.

AGREEMENTS WITH THE IAEA

• Statute of the International Atomic Energy Agency (IAEA)	Entry into force: Ratification date:	26 October 1956 20 July 1957
• Agreement on Privileges and Immunities	Entry into force:	29 August 1963
• Amendment of the IAEA statute	Entry into force: Ratification date:	27 September 1984 11 July 1985
• NPT related agreement INFCIRC/193	Entry into force:	21 February 1977
• Additional protocol to the agreement between the NNWS, Euratom and the IAEA for the application of safeguards (GOV/1998/28)	Signed:	22 September 1998
• Improved procedures for designation of safeguards inspectors	Proposals rejected but agreed to special procedure	16 February 1989
• Supplementary agreement on provision of technical assistance by the IAEA	Entry into force:	

INTERNATIONAL TREATIES

• Paris convention on third party liability in the field of nuclear energy	Entry into force: Ratification date	29 July 1960 28 December 1979
• Additional protocol to the Paris convention of 31 January 1963 supplementary to the convention Third Party Liability	Entry into force: Ratification date:	28 January 1964 28 September 1979
• Amendment to the Paris convention on third party liability in the field of nuclear energy	Entry into force: Ratification date:	16 November 1982 1 August 1991
• NPT	Entry into force:	2 May 1975
• Convention on physical protection of nuclear material	Entry into force:	6 October 1991
• Convention on early notification of a nuclear accident.	Entry into force: Ratification date:	24 October 1991 23 September 1991
• Joint protocol relating to the application	Entry into force:	21 September 1988

of the Vienna and the Paris conventions	Ratification date:	1 August 1991
• Convention on assistance in the case of a nuclear accident or radiological emergency	Entry into force:	24 October 1991
• Vienna convention on civil liability for nuclear damage	Non Party	
• Protocol to amend the Vienna convention on civil liability for nuclear damage	Not signed	
• Convention on supplementary compensation for nuclear damage	Not signed	
• Joint protocol	Entry into force:	27 April 1992
• Convention on nuclear safety	Entry into force;	13 January 1997
• Joint convention on the safety of spent fuel management and on the safety of radioactive waste management	Entry into force: Ratification date:	18 June 2001 26 April 2000
• ZANGGER committee	Member	
• Nuclear export guidelines	Adopted	
• Acceptance of NUSS codes	Summary: Serve as basis for national requirements. Design, Operation and QA Codes (once adapted) introduced into regulatory framework	6 Sept ember 1989
• Partial Test-Ban Treaty	Entry into force:	14 September 1964
• Nuclear Suppliers Group	Member	

OTHER RELEVANT INTERNATIONAL TREATIES

• European Atomic Energy Community	Entry into force: Ratification date:	25 March 1957 13 December 1957
• EURATOM	Member	
• Security control in the field of nuclear energy	Entry into force: Ratification date:	20 December 1957 9 July 1959
• European Company for the chemical processing of irradiated fuels (Eurochemic)	Entry into force: Ratification date:	20 December 1957 9 July 1959
• Establishment at Petten of the Joint Nuclear Research Centre	Entry into force: Ratification date:	25 July 1961 30 October 1962
• Civil liability in the field of	Entry into force:	17 December 1971

maritime carriage of nuclear material	Ratification date:	1 August 1991

MULTILATERAL AGREEMENTS

• Netherlands, Germany and England on collaboration in the development and exploitation of the gas centrifuge process for producing enriched uranium	Entry into force: Ratification date:	4 March 1970 18 June 1971
• Netherlands, Germany, United Kingdom and the USA regarding protection of information transferred into the USA in connection with the initial phase of a project for the establishment of a uranium enrichment installation in the USA based upon the gas centrifuge process developed within the three countries	Entry into force:	4 November 1990
• Netherlands, Germany, United Kingdom and the USA regarding the establishment, construction and operation of a uranium enrichment installation in the USA	Entry into force: Ratification date:	8 July 1993 21 March 1993

- Exchange of Notes between the Netherlands and the United States concerning the application of non-proliferation assurances to low enriched uranium supplied to Taiwan. Signed: 21 July 1999

BILATERAL AGREEMENTS

• Kingdom of the Netherlands and Brazil Application of safeguards to proposed exports to Brazil of uranium enriched in the Kingdom of the Netherlands by Urenco	Entry into force:	1 September 1978
• Kingdom of the Netherlands and Germany concerning exports of enriched uranium to Brazil	Entry into force:	4 September 1978
• Kingdom of the Netherlands and the United Kingdom concerning reprocessing of certain quantities of irradiated nuclear fuel	Entry into force: Ratification date:	12 September 1978 30 June 1981
• Kingdom of the Netherlands and France concerning reprocessing of certain quantities of irradiated nuclear fuel	Entry into force: Ratification date:	29 May 1979 17 August 1981
• Extension of the agreement of 4 April 1990 regarding protection of information transferred into the United States	Entry into force: Ratification date:	5 April 1991 7 July 1992

Appendix 2

DIRECTORY OF THE MAIN ORGANIZATIONS, INSTITUTIONS AND COMPANIES INVOLVED IN NUCLEAR POWER RELATED ACTIVITIES

NATIONAL AUTHORITIES

Ministry of Economic Affairs Bezuidenhoutseweg 30 Postbus 20101 2500 EC 's-Gravenhage, The Netherlands	Tel.: +31-70-379.89.11 Fax: +31-70-347.40.81 http://www.ez.nl/
Ministry of Social Affairs and Employment Anna van Hannoverstraat 4 P.O. Box 90801 2509 LV The Hague, The Netherlands	Tel: +31-70-333.44.44 Fax: +31-70-333.40.33
Ministry of Housing, Spatial Planning and the Environment (VROM) Rijnstraat 8 P.O. Box 20951 2500 EZ The Hague, The Netherlands	Tel.: +31-70-339.39.39 Fax: +31-70-339. 13.55
Directorate-general of the Environment Radiation Protection and Nuclear Safety Division Rijnstraat 8 P.O. Box 30945 2500 GX The Hague, The Netherlands	Tel: +31-70-339.45.94 Fax: +31-70-339.13.14

NUCLEAR RESEARCH INSTITUTE

NRG Petten Westerduinweg 3 P.O. BOX 25 1755 ZG Petten, The Netherlands	Tel.: +31 224 564082 Fax: + 31 224 563912 http://www.nrg-nl.com/index.html

OTHER NUCLEAR ORGANIZATIONS

International Radiation Protection Association (IRPA)	http://irpa.sfrp.asso.fr/
The Netherlands Nuclear Society (NNS)	http://www.ecn.nl/society/nns/
IRI TU-Delft, Mekelweg 15 2629 JB Delft, P.O. Box 5042 2629 JB Delft, the Netherlands	Tel: +31-15-278.67.12 Fax: +31-15-278.64.22
COVRA Spanjeweg 1 4455 TW Nieuwdorp P.O. Box 202 4380 AE Vlissingen, The Netherlands	Tel: +31-113-61.39.00 Fax: +31-113-61.39.50

KEMA N.V.
Utrechtseweg 310
P.O. Box 9035
6800 ET Arnhem, The Netherlands

Tel.: +31-26-356.91.11
Fax: +31-26-351.80.92/351.56.06

SEP N.V.
Utrechtseweg 310
Postbus 575
6800 EN Arnhem, The Netherlands

Tel: +31-26-372. 11.11
Fax: +31-26-443. 08.58/351.59.17

STORK-NUCON B.V.
Radarweg 60
P.O. Box 58026
1040 HA Amsterdam, The Netherlands

Tel.: +31-20-580.77.07
Fax: +31-20-580.70.44

GKN N.V.
Waalbankdijk 112a
P.O. Box 40
6669 ZG Dodewaard, The Netherlands

Tel: +31-448-41.88.11
Fax: +31 448-41.21.28

URENCO
Planthofseweg 77
P.O. Box 158
7600 AD Almelo

Tel: +31-546-54.54.54
Fax: +31-546-81 82 96
http://www.urenco.nl/algemeen/index_html.html

OTHER ORGANIZATIONS

Netherlands Energy and Research Foundation
(ECN)
Westerduinweg 1
P.O. Box 1
1755 ZG Petten, The Netherlands

Tel.: +31-224-56.49.49
Fax: +31-224-56.34.90/56.44.80
http://www.ecn.nl/main.html

European Association for Grey Literature Exploitation
(EAGLE/SIGLE) http://www.konbib.nl/infolev/sigle/ea/index.html

Elsevier Science http://www.elsevier.nl/

FOM-Institute for Plasma Physics, Rijnhuizen http://www.rijnh.nl/

World Information Service on Energy (WISE) http://www.antenna.nl/wise/

The Chemical Weapons Convention (OCPW) http://www.opcw.nl/